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10/598,213	08/21/2006	Michelle D. Griglione	GRIGLIONE 5	1211
47396	7590	05/29/2009	EXAMINER	
HITT GAINES, PC			LIU, BENJAMIN T	
LSI Corporation				
PO BOX 832570			ART UNIT	
RICHARDSON, TX 75083			PAPER NUMBER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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docket@hittgaines.com

Office Action Summary	Application No. 10/598,213	Applicant(s) GRIGLIONE, MICHELLE D.	
	Examiner Benjamin Tzu-Hung Liu	Art Unit 2893	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/17/09.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-18 canceled in amendment submitted 2/17/09.

Response to Arguments

2. Applicant's arguments with respect to claims 19-33 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102(e)

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 19-27, 31, and 33 are rejected under 35 U.S.C. 102(e) as being anticipated by U'Ren et al. (6,586,297).

With regard to claim 19, figures 1-2 of U'Ren et al. disclose a heterojunction bipolar transistor 100 comprising: a collector 102; a base 120 disposed above the collector 102, the base 120 comprising a silicon-germanium layer ("SiGe base 120"); a germanium-enriched region 230 proximate an upper surface of the base 212 and within the silicon- germanium layer 120; and an emitter 130 overlying the germanium-enriched region 230.

With regard to claim 20, figures 1-2 of U'Ren et al. disclose the limitation, wherein the germanium- enriched region 230 creates a band-gap differential between the emitter 130 and the base 120. Col 1 lines 33-37.

With regard to claim 21, figures 1-2 of U'Ren et al. disclose the limitation, wherein carrier mobility is greater in the germanium-enriched region 230 than in the base 120.

With regard to claim 22, figures 1-2 of U'Ren et al. disclose the limitation, wherein the germanium- enriched region 230 comprises a strained germanium-enriched region ("increasing the concentration of germanium in the SiGe base also increases the strain the crystalline structure of the SiGe base"). Col 1 lines 37-40.

With regard to claim 23, figures 1-2 of U'Ren et al. disclose the limitation, wherein a germanium concentration 230 in the germanium-enriched region 230 ranges from about 30 percent to about 75 percent ("40.0 atomic percent of germanium"). Col 6 line 8.

With regard to claim 24, figures 1-2 of U'Ren et al. disclose the limitation, wherein a germanium concentration 230 is greater in the germanium-enriched region (between depth 220 and 222) than in the silicon-germanium layer 120.

With regard to claim 25, figures 1-2 of U'Ren et al. disclose the limitation, having a valence band offset of greater than about 0.21 eV. Col 6 lines 20-25.

With regard to claim 26, figures 1-2 of U'Ren et al. disclose the limitation, wherein the germanium- enriched region 230 has a relatively low level of lattice defects ("the present invention advantageously minimizes defects to the crystalline lattice

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structure of metastable SiGe base 120 as a result of high dose implantation"). Col 8 lines 2-5.

With regard to claim 27, figures 1-2 of U'Ren et al. disclose the limitation, wherein the base 120 comprises a graded doped silicon-germanium base 206 or a stepped doped silicon-germanium base.

With regard to claim 31, figures 1-2 of U'Ren et al. disclose a bipolar junction semiconductor comprising: a silicon substrate 107; a collector 102 disposed in the substrate 107; a base 120 disposed overlying the collector 102, wherein the base 120 comprises a silicon-germanium portion 120; a germanium-enriched region 230 (area between depth 220 and 222) formed in the silicon-germanium portion 120, wherein a concentration of germanium 230 in the germanium-enriched region 230 is substantially greater than the concentration of germanium in the silicon-germanium portion (concentration of Ge before depth 220 and after depth 222); and an emitter 130 disposed overlying the germanium-enriched region 230 (area between depth 220 and 222).

With regard to claim 33, figures 1-2 of U'Ren et al. disclose the limitation, wherein the germanium enriched region 230 (area between depth 220 and 222) includes at least a 30% germanium concentration ("40.0 atomic percent of germanium"). Col 6 line 8.

Claim Rejections - 35 USC § 103

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4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over U'Ren et al. (6,586,297) in view of Ahn et al. (2001/0003667).

With regard to claim 28, U'Ren et al. discloses all the subject matter claimed except for the limitation, wherein the base comprises a uniformly doped silicon-germanium base.

However, figure 6 of Ahn et al. discloses the limitation, wherein the base 26 comprises a uniformly ("uniform") doped silicon-germanium base ("silicon-germanium"). Par [0031].

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of U'Ren et al. with the limitation of Ahn et al. in order to reduce emitter resistance to avoid emitter degeneration and its attendant current-gain reductions. Par [0031] of Ahn et al.

Claims 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U'Ren et al. (6,586,297) in view of Dunn et al. (2002/0132438).

With regard to claim 29, U'Ren et al. discloses all the subject matter claimed except for the limitation, wherein the germanium-enriched region is in contact with the emitter.

However, figure 3 of Dunn et al. discloses the limitation, wherein the germanium-enriched region 60 is in contact with the emitter 64.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of U'Ren et al. with the limitation of Dunn et al. in order to provide a bipolar transistor having high-operating device performance and increased switching speeds. Par [0017] of Dunn et al.

With regard to claim 30, U'Ren et al. discloses all the subject matter claimed except for the limitation, wherein a concentration of germanium in the germanium-enriched region decreases abruptly from a concentration proximate the upper surface in a direction toward the collector.

However, figure 3 of Dunn et al. discloses the limitation, wherein a concentration of germanium 60 in the germanium-enriched region 60 decreases abruptly from a concentration proximate the upper surface (between emitter 64 and base 60) in a direction toward the collector 68.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of U'Ren et al. with the limitation of Dunn et al. in order to provide a bipolar transistor having high-operating device performance and increased switching speeds. Par [0017] of Dunn et al.

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over U'Ren et al. (6,586,297) in view of LeGoues et al. (J. Appl. Physics 1989).

With regard to claim 32, figures 1-2 of U'Ren et al. disclose all the subject matter claimed except for the limitation, wherein the germanium- enriched region comprises a thermally oxidized enriched region.

However, LeGoues et al. discloses the limitation, wherein the germanium- enriched region ("enriched SiGe alloy") comprises a thermally oxidized ("oxidation of SiGe alloy") enriched region ("enriched SiGe alloy"). Introduction lines 20-22.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of U'Ren et al. with the limitation of LeGoues et al. in order to enhance oxidation rates. Abstract of LeGoues.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin Tzu-Hung Liu whose telephone number is (571)272-6009. The examiner can normally be reached on Mon-Fri 9:30 AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on 571 272 1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BTL
5/27/2009

/Ngan Ngo/
Primary Examiner, Art Unit 2893